

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

DRY HYDRANT

(Each)

CODE 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into a water source that permits the withdrawal of water by suction.

PURPOSE

This practice may be applied to provide all weather access to an available water source for fire suppression.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies where an adequate volume of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

Site Accessibility. Prior to construction obtain a letter of approval to use the site from the landowner. Prior to installation of the dry hydrant, review access, topography, elevations, and dry hydrant location with fire department personnel. Locate or develop fire truck and pumper unit vehicle accessibility to the dry hydrant in conjunction with local fire officials.

Provide a well drained all-weather surface access road a minimum of 12 feet wide to facilitate movement by personnel and equipment during an emergency.

Clearly mark the dry hydrant in a manner acceptable to the fire department.

In order to limit the length of suction lines, locate the fire truck and pumper connection within 10 feet of the edge of the access.

If the dry hydrant is located in a constructed impoundment, locate the access road and fire truck and pumper connection at a higher elevation than the auxiliary spillway.

Upon completion of construction, provide a copy of the location map showing the exact site of the hydrant and vehicle access to the local fire department and to the landowner.

Water Requirement. The minimum quantity of water available to a dry hydrant is the amount obtainable at not over 15 feet total static lift during a drought. An adequate volume of water is defined as a minimum of 30,000 gallons (1.1 acre-inches) of pumpable

impounded water or a minimum pump flow rate of 250 gallons per minute (gpm) without interruption for 2 hours.

The Insurance Service Office (ISO) is the fire insurance rating organization for Texas. *The current ISO minimum requirements for "Class 8 protection" are: 1) a minimum water supply of 250 gallons per minute shall be available for a 2 hour duration for fire protection throughout the area to be recognized. 2) There shall be at least one piece of responding, suitably equipped apparatus that has a pump capable of at least 250 gallons per minute rated at 150 psi.*

Determine the adequacy of the water supply in accordance with appropriate local criteria. Determine the volume of water in impoundments using RESOP or other similar computer programs or models. Determine the adequacy of streamflow sources using regional analysis of stream gage data or other appropriate techniques.

The ISO rating system requires that the minimum supply be available during a drought having an average 50-year frequency.

The 50-year frequency drought level in ponds or reservoirs may be determined from Texas Engineering Technical Note No. 210-11-TX1, "Planning and Design of Dry Hydrants".

Pump Lift. Install the hydrant so that the top of the fire truck pumping connection or the centerline of pump (whichever is higher) is no more than 15 feet in elevation above the centerline of the dry hydrant pipe intake.

Coordinate with the local fire department to determine the proper height of the fire truck pumper connection. Typically this height is approximately 24 inches above the ground surface, but must never be higher than the intake of the fire truck drawing from the dry hydrant. The total lift (pumping head) must not exceed 20 feet when all losses are totaled. Pumping head losses include head loss from the strainer, elbows, line friction, elevation (static head), and the suction hose connecting the dry hydrant to the fire truck.

Pipe. The pipe material may be flexible conduit such as plastic pipe, steel pipe, aluminum pipe, or ductile iron pipe that meets material specifications.

Design the pipe, using NRCS National Engineering Handbook (NEH) Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits, to withstand pumping pressures at design flow to meet water requirement criteria.

Use pipe with a nominal diameter of 6 inches or larger. Use no more than two 90-degree elbows in the entire pipe system. Fit the pipe with an intake strainer and hydrant head with standard fire truck hose adapters acceptable to the local fire department, for quick connect/release.

Plastic pipe shall be a minimum of schedule 40, SDR-26. Protect plastic pipe from ultraviolet rays. The depth at which the pipe is installed shall be below the frost-free depth for the area.

Pipe Intake. Install the top of the pipe intake 2 feet below the low water surface elevation and at least 2 feet below the frost-free depth for the area, whichever is deeper.

Install the dry hydrant intake pipe on a slope toward the water source in order to avoid accumulation of sediment in the joint. Support and secure the intake screen or strainer at least two feet above the pool bottom and at least four feet beyond the earth slope in pits or impoundments.

The underwater support shall be constructed of concrete or non-corrosive metal. It shall be of sufficient design to support and stabilize the strainer inlet and to provide ease of adjustment.

In streams, the intake screen or strainer shall be anchored in a 2 to 4 feet deep by 4 feet wide bed of crushed stone or gravel located below the streambed. The inlet end of the screen or strainer shall be capped to prevent entry of silt and debris.

In concrete or steel water storage facilities the intake may be secured at or near the bottom of the facility. Installation shall conform to manufacturer's recommendations.

Strainer. Fabricate a strainer of material compatible with the pipe or use corrosion resistant manufactured well screens. Use non-corrosive materials for all components, including pins. Screens and strainers must have a minimum open area of 4 times the pipe cross sectional area with individual inlet holes no greater than 3/8-inch in diameter.

A strainer may be formed by drilling ¼-inch to 3/8-inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Debur drill holes and clean the pipe before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

End Cap. Cap the inlet end of the intake pipe with a perforated end cap that is easily removed without special tools. Perforations improve flow conditions into the strainer and allow jetting action for silt cleanout.

Dry Hydrant. Do not use conventional dry barrel hydrants, such as those found in public water supply systems. It is necessary dry barrel hydrants be absolutely airtight and as a result, excess suction loss may occur if used for a dry hydrant installation.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs, such as in a high vandalism area or for low profile and aesthetic needs. Also referred to as a flush mount hydrant, this type of dry hydrant does not require the 24-inch riser. It may be used with the 45° or straight dry hydrant head assembly.

Dry Hydrant Head. Use a bronze, brass, aluminum alloy, or other durable, non-corrosive metal hydrant sleeve permanently affixed inside the head acceptable to the local fire department, for quick connect/release. Sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.

The hydrant head must accept a 6-inch NST (National Standard Thread), also known as NH (National Hose thread), connection to provide maximum supply. Hydrant (6 inch) head shall conform to ASTM 2466.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "O" ring between the threaded sleeve and PVC head.

Dry Hydrant Cap. Install a snap-on/snap-off cap that is removable without special tools and joined permanently to the dry hydrant head with a steel cable or chain. Use a cap made of hard plastic or of same metal as NST connection for maximum corrosion resistance.

Testing. Allow pipe joint sealants to cure before testing the piping system. The local fire department is responsible for performing an initial pump test at the design capacity after installation to confirm satisfactory operation. Give careful attention to silt, debris, or other interference that may limit the full operation of the hydrant.

Protection. After the dry hydrant is installed, grade the site to provide surface drainage and vegetate or otherwise protected from erosion. Vegetate in accordance with conservation practice standard Critical Area Planting Standard and Specification (342).

All materials shall meet or exceed the minimum requirements for materials described in the various sections of this standard.

Markings. *The dry hydrant shall be clearly marked with appropriate signs acceptable to the local fire department. Use of reflective paint on signs and connection cap will help improve visibility during emergencies. Guard posts, guard rails, or other physical barriers shall be installed if needed to protect the above ground pipe system.*

Access. *Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access to and from the dry hydrant shall not interfere with or create a safety hazard to emergency or other vehicular traffic. When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public road is recommended for safety of the emergency personnel and the public.*

CONSIDERATIONS

Use of the dry hydrant during emergencies may reduce available water quantity for livestock, fish and wildlife, other aquatic organisms, recreation, and other related uses. If the operation of the dry hydrant will dewater the water sources, include mitigation measures in the design to address these issues.

Appropriate erosion and sediment control measures are required during and immediately following construction.

Effect of the use of the dry hydrant on upstream and downstream water quantity.

Pumping from dry hydrants installed in ponds may improve water quality by removing anoxic bottom water containing sediment and high levels of nutrients.

Installation of the entire length of horizontal pipe below the water surface is also desirable.

If streams are used as a water source, those with sand, gravel, or rock bottoms provide the best operating conditions.

Consideration should be given to meeting water requirements of the Texas Key Rate Schedule.

A spill mitigation plan is advisable in order to mitigate the possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant. This practice has the potential to negatively affect National Register listed or eligible (significant) cultural resources (archaeological, historical or traditional cultural properties); it also has the potential to protect listed or eligible historic structures. Consider these factors during planning and also follow the NRCS State policy during construction and maintenance.

The hydrant head is vulnerable to vehicle damage. Consider installing a steel post (recommend 3" diameter or larger) adjacent to and on both sides of the head, allowing for adequate personnel access.

Consider visibility and sight distances when locating access roads and pull-off areas

PLANS AND SPECIFICATIONS

Prepare plans and specifications for dry hydrants that describe the requirements for applying the practice according to this standard. Obtain required permits prior to initiating any work. As a minimum, include the following items in the plans and specifications:

- Dry hydrant location
- Plan view of the installation
- Profile of the pipe line
- Access road requirements
- Details of pipe intake
- Details of stand pipe, including hydrant head.
- Site stabilization requirements
- Materials list

Plans and specifications shall be prepared for each hydrant, and shall be based on this standard. Plans and specifications include construction plans, drawings, job sheets, construction specifications, or other similar documents. These documents are to specify the

requirements for installing the practice, such as the kind, amount, or quality of materials to be used, or the timing or sequence of installation activities.

Construction Specifications describing the requirements for applying this practice shall be developed from the generalized Construction Specifications (Texas) for Dry Hydrant. The Construction Details section shall be used to describe site specific job requirements

Required easements, permits, and ingress and egress shall be obtained prior to initiating any work. Copies of easements and permits should be obtained for NRCS files.

OPERATION AND MAINTENANCE

Develop and provide an operation and maintenance plan to the owner and operator of the dry hydrant. The minimum requirements to be address in the operation and maintenance plan are:

1. Keep the site clear of obstruction and mow the dry hydrant access area regularly to maintain ready access to the hydrant for emergency use. *For protection from fires, all vegetation should be controlled within 5 feet of the dry hydrant riser.* When feasible, schedule mowing to take place outside of the primary nesting season for grass-nesting birds.
2. Pumper test the dry hydrant annually at the maximum designed flow rate to verify site usability. Back flush the system before testing. Inspect the hydrant each spring and fall and back flush if necessary to remove silt or sediment debris that may have accumulated on the screen.
3. Regularly clear the intake screen of excess aquatic growth that may limit full operation of the dry hydrant.

REFERENCES

USDA-NRCS, National Engineering Handbook, Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits.

Insurance Service Organization

National Fire Protection Association (NFPA)

Engineering Technical Note No. 210-11-TX1 "Planning and Design of Dry Hydrants", July 1993

APPROVAL AND CERTIFICATION

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PRACTICE STANDARD APPROVED:

/s/ JOHN W. MUELLER
State Conservation Engineer

October 31, 2014
Date